



California Edwards AFB

Facility and Location

Edwards Air Force Base (AFB) occupies 470 square miles and contains approximately 301,000 acres of largely undeveloped land in the Mojave Desert near Rosamond. It is used predominantly for aircraft test ranges and maintained and unmaintained landings. Due to ideal weather conditions and its location, Edwards AFB is a practical location to test aircraft and serves as an ideal alternate landing site for space shuttle flights. The site contains natural playas (Rogers and Rosamond dry lakebeds) that serve as runways for many flight test programs. Both lakebeds have been used for emergency and test landings of aircraft for more than 40 years.

The NASA Jet Propulsion Laboratory (JPL), now designated as Operable Unit (OU) 5/10, was located at North Base. It was used to develop and test solid fuel propellants for rocket and missiles systems. The solid propellant testing that occurred in the 1950s and 1960s is suspected as the source of perchlorate contamination in groundwater at North Base. The Air Force Research Laboratory (AFRL) also conducted solid rocket motor testing at several locations on the base not associated with the JPL sites, now designated as OUs 4 and 9.

Media Sampled and Findings

Drinking Water — In 2008, four samples reported no detection. In 2007, two of two samples detected perchlorate at 0.2 and 0.34 ppb. Prior to 2007, 1 of over 30 samples detected perchlorate at 0.22 ppb.

Groundwater — In 2011, 79 of 83 samples detected perchlorate from 0.15 to 490 ppb. In 2010, 132 of 216 samples detected perchlorate from 0.02 to 2,800 ppb. In 2009, 172 of 300 samples detected perchlorate from 0.02 to 2,300 ppb. In 2008, 72 of 73 samples detected perchlorate from 1.23 to 7,700 ppb. In 2007, 20 of 20 samples detected perchlorate from 0.88 to 1,600 ppb. Prior to 2007, perchlorate was detected at the base in shallow groundwater that also contains high levels of naturally occurring total dissolved solids. Groundwater samples were collected from Sites 282, 285, and 422 at North Base, former JPL, and at AFRL Sites 36, 37, 116, 120, 127, 133, 162, 177, 178, and 325. Of the 376 groundwater samples collected from both areas, the maximum detection of 30,700 ppb was found at Site 285 at North Base and is assumed to be a result of the propulsion research conducted at the site. At AFRL sites, perchlorate concentrations in groundwater ranged from 4 ppb to 114 ppb with the highest detection at Sites 177 and 325.

Soil — In 2010, 19 of 26 samples detected perchlorate from 0.01 to 110 ppb. In 2007, three of three samples detected perchlorate from 9.8 to 13 ppb. Prior to 2007, 37 samples taken from North Base Site 285 reported a maximum detection of 2,100,000 ppb. Elevated levels of



perchlorate at this location are attributed to former propulsion research by JPL. In August 2004, eight shallow soil samples at AFRL Site 36 were collected. Perchlorate concentrations for these samples ranged from 0.18 ppb to a maximum of 146 ppb. Elevated levels of perchlorate concentrations at this location are attributed to the aboveground waste evaporation tank that was used to contain waste water generated during solid propellant (ammonium perchlorate) cutting activities.

Test Pit Standing Water — In 2010, one sample detected perchlorate at 3.1 ppb. In 2009, two of two samples detected perchlorate at 8.4 and 8.7 ppb.

Appropriate Actions

Drinking water concentrations are below the California Maximum Contaminant Level of 6 ppb. However, groundwater samples have been above the EPA and DoD Preliminary Remediation Goal (PRG) of 15 ppb and past soil samples were found above the 55,000 ppb residential and 720,000 ppb soil screening levels recommended by EPA Region IX. Routine sampling events occur during groundwater monitoring every two years. Sites where perchlorate was detected above the PRG are tested on a quarterly basis unless they are part of an active remediation system treatment study. Edwards AFB has taken the subsequent actions to address perchlorate levels at the various sites where perchlorate was detected.

At Sites 13 and 37, the source of perchlorate in groundwater is Site 133. At Site 36 (also part of AFRL), about 20 cubic feet of perchlorate contaminated soil was excavated and removed, completing a remedial action. Post-excavation sampling in 2011 detected perchlorate at concentrations up to 146 ppb in groundwater. Groundwater contamination is being addressed in AFRL Arroyos Record of Decision (ROD). Based on a 2007 ROD, no treatment of perchlorate in groundwater is required due to the remote location and difficulty of cleanup in fractured bedrock, but long term monitoring is anticipated. Groundwater is currently being monitored under the ROD and a 2002 landfill post closure maintenance and monitoring plan.

At Sites 177 and 325, an in situ bioremediation (ISB) study showed significant degradation of perchlorate for wells affected by electron donor. However, the proposed remedy for contaminated groundwater is likely to include waiver of cleanup standards due to the large size of the plume, fractured bedrock difficulty, and groundwater modeling analysis. Groundwater is currently being monitored in accordance with the established monitoring plan.

At Site 188, an area of concern (AOC) was removed from the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process under the condition that contaminated groundwater underlying this and other sites be addressed as part of Site 282. Contaminated groundwater within the liquid propellant sector of the former JPL at OU 5/10 and Site 189 (Bldg 4207) are also being addressed under Site 282. These sites are currently undergoing a Feasibility Study and will be included in the Edwards Performance Based Remediation (PBR) in 2014.

At Sites 196 and 286, the AOCs were removed from the CERCLA process with the understanding that groundwater contamination will be addressed with Site 285. No significant amount of perchlorate was identified in soil during the Remedial Investigation. Site 285



continues the CERCLA process for soil and groundwater contamination. One pilot test and four treatability studies have been performed at Site 285 from 2001 to present. The presumptive remedy is to continue the extraction system. The site will be included under the Edwards PBR in 2014.

The pilot scale treatability study groundwater extraction and treatment system (GETS) was installed in 2002 at Sites 188, 196, 285, and 286 and is still operational. During the recent reporting period from GETS, perchlorate concentrations detected at extraction well 286- MW02 remained relatively constant. Modeling at Site 285 indicates that contaminants would be reduced to below regulatory levels in eight years. It is assumed soil flushing done at Site 285 as a completed treatability study would be installed at Building 4235 and 4241. A soil flushing study was conducted at Building 4283 where concentrations reduced from 110,000 ppb to 300 ppb following soil flushing. Site 285 areas require action for soil. A final FS Report is in preparation for OU 5/10 and is scheduled for completion in 2013. The final remedy will be selected upon approval of the ROD, estimated to be November 2015.

At Site 333, a 2010 ISB study involving sub-surface Newman Zone (which can facilitate breakdown of perchlorates) showed some encouraging treatment results. During the first sampling event perchlorate concentrations dropped to non-detect. The prospect for using ISB or any other treatability study/remediation technology at Site 333 is limited because of the tight, fractured nature of the water bearing zones. Groundwater is currently being monitored in accordance with the established monitoring plan.